canceller is associated. As shown in FIG. 9, each echo canceller 40 includes one filter 85. These filters 85 model the impulse responses of the echo noise from the transmitter and may be implemented as ATFs employing, for example, the LMS algorithm. The filter produces a replica of the echo impairment signal contained within the combination signal received by the receiver with which the echo canceller 40 is associated. The replica echo impairment signal 90 is introduced into the second device 50 (FIG. 9) where it is combined with the combination signal 48 to produce the first soft decision signal 52 which is substantially devoid of echo impairment signals.

FEXT cancellation is accomplished with three adaptive FEXT cancelling filters 87 as shown in the block diagram of FIG. 13. Each FEXT cancellation system 70 receives three tentative decision symbols 74 one from each of the receivers at the same end of the communications line as the receiver with which the FEXT cancellation system is associated. Each FEXT cancellation system 70 includes three filters 87, one for each of the tentative decision symbols 74. These filters 87 model the impulse responses of the FEXT noise from transmitters and may be implemented as ATFs employing, for example, the LMS algorithm. The filters 87 produce a replica of the FEXT impairment signal 96 for each individual tentative decision symbol 74. A summing device 108 combines the three individual replica FEXT impairment signals 96 to produce a replica of the FEXT impairment signal contained within the combination signal 48 received by the receiver with which the FEXT cancellation system is associated. The replica FEXT impairment signal 94 is introduced into the first device 56 (FIG. 9) where it is combined with the second combination signal 66 to produce the third soft decision signal 68 which is substantially devoid of FEXT impairment signals. It is important to note that the higher error rate of the tentative decisions 74 does not degrade the performance of the FEXT cancellation system 70, because the decisions used to cancel FEXT are statistically independent from the final decisions 72 made by the receiver whose FEXT is being canceled. Details of a FEXT cancellation system are disclosed in copending patent application S/N 09/037,328, filed March 9, 1998, entitled APPARATUS FOR, AND METHOD OF, REDUCING NOISE IN A

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COMMUNICATIONS SYSTEM, inventor Oscar E. Agazzi and assigned of record to the assignee of record of this application.

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Please replace the paragraph(s) at page 17, lines 23-31 and page 18, lines 1-20, with the following paragraphs:

As previously mentioned, the NEXT cancellation system, echo canceller and FEXT cancellation system use ATFs to effectively cancel the noise from the combination signal. An example of an ATF which may be employed by the present invention is shown in FIG. 14 and is further disclosed in copending patent application S/N 60/107,877, filed November 9, 1998 entitled DIRECT-TRANSPOSED FILTER, inventor Mehdi Hatamian and assigned of record to the assignee of record of this application. The ATF 120 includes a plurality of taps 122 each including a multiplier 124 and an adder 126. Associated with each tap 122 is a coefficient Cn, where n is 0 through x-1 where x is the number of taps in the ATF. The circuitry associated with each tap 122 includes a 1-bit storage (not shown) that allows for activation and deactivation of the tap. The values of the coefficients Cn are adjusted in accordance with an LMS algorithm as mentioned before. Interposed between the taps 122 are registers 128. These registers 128 provide data to the taps 122 at timed intervals in accordance with a clock signal. A suitable register 128 for use in the present invention is disclosed in copending patent application S/N 60/107,878, filed November 9, 1998, entitled STATIC-DYNAMIC REGISTER, inventor Mehdi Hatamian and assigned of record to the assignee of record of this application.

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The impulse responses of an echo and NEXT, as shown in FIGS. 7 and 8, indicates that not all taps 122 in the NEXT and echo cancellers 38, 40 are contributing significantly to the performance of the communications system. The present invention determines what taps 122 are not contributing significantly to the reduction of the mean squared error (MSE) of the system and deactivates these taps, thereby eliminating them from the filtering computation and thus reducing considerably the power dissipation of the system. Furthermore, as shown by the impulse response of FIGS. 7 and 8, the need to build NEXT and echo cancellers 38, 40 with a long span is difficult to avoid. Specific cable responses may differ from the one depicted in FIGS. 7 and 8,